

VEGETABLE CROPS

CORNELL COOPERATIVE EXTENSION

Bean Anthracnose

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Bean anthracnose, caused by the fungus *Colletotrichum lindemuthianum*, is a major disease of beans (*Phaseolus vulgaris* L.), causing serious crop loss in many parts of the world. In 1921, M. F. Barrus of Cornell University demonstrated that bean anthracnose is seedborne. This information resulted in the widespread use of anthracnose-free seed and a subsequent decline in the occurrence of bean anthracnose in the United States. In bean-growing areas that receive frequent rainfall, however, such as central and western New York State, epidemics of the disease may develop. Production is reduced because of poor seed germination, poor seedling vigor, and low yields. Marketing losses are attributed to seed spots and blemishes, which lower their quality rating and salability. The disease is most common and severe on dry and snap beans (*P. vulgaris*) but may also affect lima bean (*P. lunatus* L.), scarlet runner bean (*P. multiflorus* Willd.), mung bean (*P. aureus* Roxb.), cowpea (*Vigna sinensis* Savi.), and broad bean (*Vicia faba* L.).

Symptoms and Signs

Seedlings grown from infected seeds often have dark brown to black sunken lesions on the cotyledons and stems (figs. 1 and 2). Severely infected cotyledons senesce prematurely, and growth of the plants is stunted. Diseased areas may girdle the stem and kill the seedling.

Under moist conditions, small, pink masses of spores are produced in the lesions. Spores produced on cotyledon and stem lesions may spread to the leaves. Symptoms generally occur on the underside of the leaves as linear, dark brick-red to black lesions on the leaf veins (fig. 3). As the disease progresses, the discoloration appears on the upper leaf surface. Leaf symptoms often are not obvious and may be overlooked when examining bean fields.

The most striking symptoms develop on the pods. Small, reddish brown to black blemishes and distinct circular, reddish brown lesions are typical symptoms (fig. 4). Mature lesions are surrounded by a circular, reddish brown to black border with a grayish black interior (fig. 5). During moist periods, the interior of the lesion may exude pink masses of spores. Severely infected pods may shrivel, and the seeds they carry are usually infected. Infected seeds have brown to black blemishes and sunken lesions (fig. 6).

Disease Cycle

The fungus survives the winter primarily in bean seed. Survival in soil or in plant residue varies greatly, depending on environmental conditions. Research conducted in Canada has shown that the fungus can survive 5 years in infected bean pods and seeds that are air-dried and stored at 4° C. Survival is drastically reduced, however, when infected materials are buried in the field and come in contact with water. Laboratory tests have shown that alternating wet-dry cycles in soil reduce survival of the fungus.

Cool to moderate temperatures and prolonged periods of high humidity or free water on the foliage and young pods promote anthracnose development. Moisture is required for development, spread, and germination of the spores as well as for infection of the plant. A prolonged wet period is necessary for the fungus to establish its infection. The time from infection to visible symptoms



ranges from 4 to 9 days, depending on the temperature, bean variety, and age of the tissues. The fungal spores are easily carried to healthy plants in wind-blown rain and by people and machinery moving through contaminated fields when the plants are wet. Frequent rainy weather increases disease occurrence and severity.

Control

Cultural

Control is best achieved by using anthracnose-free seed. Western-grown, certified seed is highly recommended. Anthracnose development is unlikely on seed produced in semiarid areas, which have little rainfall and high temperatures during the growing season. In contrast, seeds produced in the Northeast are exposed to summer rains and high humidity during the growing season, and the risk of developing anthracnose is increased.

The fungus survives best on bean seed and to a lesser extent on dried pods and straw. Cleaning and bagging stations in areas where anthracnose has been a problem may be sources of contaminated dust. Thus these stations should be cleaned of debris between shipments and the shipments isolated.

Since the fungus is disseminated in the presence of water, fields should not be entered for cultivation or pesticide applications when the plants are wet. Avoiding unnecessary movement in infested fields will minimize the spread of the disease.

Because the fungus does not survive well under field conditions, infested bean debris should be incorporated in the soil after harvest to reduce winter survival. A two-year crop rotation is highly recommended as insurance against winter survival, and it provides some control of root-rotting organisms.

Bean varieties resistant to anthracnose are available from seed companies. The use of resistant varieties, however, is complicated by the presence of several forms or races of the fungus, and plants

resistant to one race may be susceptible to another. Varieties must be tested where they are to be grown to determine their tolerance to the locally prevalent races.

Chemical

At this time, no seed treatments for control of anthracnose on dry beans are registered in New York State. The efficacy of seed treatments is variable because deep-seated infections frequently survive the treatment.

Foliar applications of protectant fungicides may reduce disease severity in the field, but normally fungicides are not economical. The effectiveness of foliar fungicides varies because the wet weather conducive for anthracnose development also washes and weathers the applied fungicide. Refer to the most recent issue of *Cornell Recommendations for Commercial Vegetable Production* for products registered for use on dry beans, and follow label directions.

Acknowledgments

Appreciation is extended to Joe Ogrodnick for photographic assistance.

Quantity discount available.

This publication is issued to further Cooperative Extension work mandated by acts of Congress of May 8 and June 30, 1914. It was produced with the cooperation of the U.S. Department of Agriculture and Cornell Cooperative Extension, College of Agriculture and Life Sciences, College of Human Ecology, and College of Veterinary Medicine, at Cornell University. Cornell Cooperative Extension provides equal program and employment opportunities. Lucinda A. Noble, Director. 56/90.6/88 CP 3M E88030904